ORIGINAL ARTICLE

ANALYSING THE KNOWLEDGE & PRACTICE OF CROSS INFECTION CONTROL AMONG PAKISTANI & SWEDISH DENTAL STUDENTS

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ABSTRACT

Dentists are at risk of exposure to disease agents through contact with blood or other potentially infectious materials. To minimize the risks of disease transmission from a patient to a dentist or from a dentist to the patient, strict infection control measures need to be followed. The purpose of this study was to compare the knowledge & practice of infection control measures among Pakistani and Swedish dental students. A total of 110 questionnaires were filled out of which only 100 were selected for the study in Pakistan & Sweden. The type of study is observational cross-sectional. Data was entered & analyzed by statistical software with a confidence interval of 95%. Cross infection control practice among Swedish dental students was superior as compared to dental students in Pakistan. Out of 100 students in both countries, the practice for personal protection in terms of gloves was followed by all of the students. The use of protective footwear was only 16% in Pakistani students as compared to 97.8% in Swedish students. Only 66% Pakistani students were screened for Hepatitis B & C as compared to 100% Swedish students. A substantial 44% Pakistani students experienced needle stick injury as compared to 37.8% Swedish students (p value is 0.130). The students in Pakistan and Sweden were well equipped about the knowledge of standard cross infection protocols. The practice towards cross infection control in both the countries was encouraging. There is a greater need for hepatitis screening among Pakistani students. Adequate steps should be taken to minimize the incidence of needle stick injury among the students of both the countries.

Key Words: *Cross infection, Pakistani and Swedish dental students, Infection control measures.*

INTRODUCTION

Infection control procedure, although well recognized in general medicine and surgery, were late in coming to dentistry. The concept of asepsis and its role in the prevention of infection control was put forward nearly two centuries ago. The clinician has a professional responsibility for implementing effective infection control measures to protect other patients and safe practice of all members of the dental team.

Cross infection can be defined as the transmission of infectious agents between patients and staff within a clinical environment.[1] The oral cavity is an environment in itself, providing a nutritive medium for bacterial growth. Infections may be transmitted in the dental operatory through several routes, including direct contact with blood, oral fluids or other secretions; indirect contact with contaminated instruments, operatory equipment, or contact with airborne contaminants [2]. Studies have shown that the environment (water, air, surface) can play an important role in cross-infection. Water stagnation, lack of disinfection in dental unit system promotes proliferation of microorganisms. Disease transmission can occur easily in Dental clinics making dental professionals at risk of infections caused by Hepatitis B, C & HIV viruses. In the late 1970s, a study found that dentists were three times more likely than the general population to contract hepatitis B, another study concluded that dental professionals are at a greater risk for acquiring cross-infection while treating patients [3]. This makes cross-infection control a significant aspect of concern in dental practice and among dental professionals. Numerous surveys and studies have shown that the incidence of hepatitis B developing after needle stick injuries from Hepatitis B positive patients is approximately 20.0 % compared with an estimate of 0.4 % following similar exposure to the HIV [4]. Occupational exposure has been claimed to be an important means for hepatitis B virus infection transmission and dental health professionals are considered to be at high risk in this regard [5]. Dental education can play a vital role in training of students in their early learning years, helping them to adapt to

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latest trends and adequate knowledge and attitudes related to infection control measures.

Paramount to the prevention of infectious disease is the strict adherence to universal precautions for all patients [1].That includes eye protection, facemasks & protective clothing. Vaccinations are very useful in ensuring that the health care personnel do not get exposed unnecessarily to the occupational-related infections. Standard isolation precautions are designed to reduce the risks of acquiring occupational infections from both known and unknown sources in the health care setting [1] .In order to benefit from the available protective measures, it is recommended that a strong emphasis should be given to cross infection control protocols in the undergraduate and postgraduate curriculum of dental institutes & colleges. Comparing the level of knowledge and practice of cross infection control protocol being followed among Swedish dental students is due to the fact that Scandinavian countries have strict protocol regarding cross infection control in dentistry as compared to Pakistan. Although efforts have been made to vaccinate health care workers in Pakistan, many do not get vaccination or do not complete the vaccination schedule. This would also be beneficial in understanding & analyzing their knowledge of different infectious diseases being transmitted due to these routes. Although many surveys about cross infection control procedures have been carried out in several countries , there is no comparative study in recent literature about how Pakistani and Swedish dental students manage the control of cross infection in their practice. Better education, using a multi-faced approach, and institutional policy are required if knowledge towards infection control practices are to be improved and maintained. The objective of this study is to analyze the level of knowledge and practice of cross-infection control protocols being followed among Pakistani and Swedish Dental students.

MATERIALS AND METHODS

Study Design

The study was conducted as an observational cross section survey in two separate dental institutes. First the survey was performed in Sweden as a computer generated questionnaire in 2014. Similar questionnaire was provided to final year students at a dental college in Pakistan in early 2015. A total of 110 questionnaires were filled out of which only 100 were selected for the study, the remaining 10 questionnaires were not completely filled. The study was to analyze and compare the knowledge and practice of cross infection control measures between Pakistan and Swedish dental students.

Data Collection Procedure

The survey questionnaire was designed to evaluate the cross infection control practice among final year students in Pakistan at Islamic international dental college & hospital, Islamabad and in Sweden at Karolinska institute, Stockholm. The questionnaire was revised by infection control expert & assessed for its practicability. An approval of Ethical review committee was taken from Islamic international dental college and hospital, Islamabad. Pakistan. Whereas consent from all participant from Sweden was taken via computer generated questionnaire. Strict confidentiality protocol for all responses was emphasized. The questionnaire has three subsections with two sections having few basic questions regarding knowledge possessed by the students about the related section whereas, the rest of the questions were related to the assessment of practice.

The first section of the survey questionnaire included personal information of the students participating in the study as their age, gender, marital status, allergies etc. These details were included in this questionnaire as they have been known to affect the infection control practices. The second section included assessment of knowledge possessed by the participants regarding personal protection measures including use of gloves, masks, eye protection and lab-coats. This section included 5 out of 11 questions regarding knowledge about personal protection measures. Whereas, the remaining questions were related to the practical aspect of personal protection measures. Third section included cross infection measures practiced by the participating students. This section has 8 out of 22 questions regarding knowledge about immunization, sterilization of instruments & disinfection of work surfaces. Rests of the questions were about the practice of immunization, sterilization of instruments and disinfection of work surfaces.

The inclusion criteria includes BDS students of final year from both the institutes, between age group of 15 to 35 years. The students who did not gave consent or incomplete questionnaire were excluded from the study.

Statistical Analysis

The data was entered & analyzed by statistical software (SPSS for windows version 22, SPSS Inc, Chicago, USA) with a confidence interval of 95% .No discrepancies were found in the data. Frequencies for the demographic variables of both the dental institutes were calculated and compared. Frequencies and proportions for infection control practices which includes personal protection, surgery design, sterilizing instruments, infection control protocol practices for work surfaces and immunization status of the participants.

RESULTS

A total of 110 questionnaires were filled out of which a total of 100 were selected for our study, 50 from

TABLE 1: CHARACTERISTICS OF PARTICIPANTS IN THE SURVEY OF DENTISTS IN PAKISTAN AND SWEDEN

Characteristic	Frequencies (Percent) in Pakistan N=50 % (n)	Frequencies (Percent) in Sweden N=50 % (n)	P - value
Gender			
Male	9 (18 %)	16 (32 %)	0.899
Female	41 (82 %)	34 (68 %)	
Age			
15 - 20	1 (2 %)	1 (2 %)	
21- 25	49 (98 %)	24 (48 %)	-
26 - 30	-	22 (44 %)	
31- 35	-	3 (6 %)	
Marital Status			
Married	0 (0 %)	38 (76 %)	-
Unmarried	50 (100 %)	12 (24 %)	
Allergies			
Present	10 (20 %)	42 (84 %)	-
Absent	40 (80 %)	8 (16 %)	

TABLE 2: COMPARISON OF REPORTED INFECTION CONTROL PROTOCOL: KNOWLEDGE & PRACTICE OF PARTICIPATING STUDENTS IN PAKISTAN AND SWEDEN

Infection Control Knowledge & Practice	Frequencies (Percent) in Pakistan N= 50 % (n)	Frequencies (Percent) in Sweden N=50 % (n)	P – value
Wear Facemask	50 (100%)	44 (88%)	-
Wear Goggles	13 (26 %)	38 (76 %)	0.371
Wear Shield	5 (10 %)	25 (50 %)	0.967
Wear Footwear	8 (16 %)	44 (88 %)	0.664
Wear Overall	48 (96 %)	42 (84 %)	0.699
Remove Jewelry	30 (60 %)	45 (90 %)	-
Replace/remove Torn Glove	48 (96 %)	45 (90 %)	-
Change Napkin	48 (96 %)	45 (90 %)	-
Double gloves & mask for Hepatitis	40 (80 %)	45 (90 %)	-
Surgery Design	31 (62 %)	45 (90 %)	-
Foot control	10 (20 %)	39 (78 %)	0.048
Have High Vacuum Suction	17 (34 %)	41 (82 %)	0.007
OP* field away from reception	27 (54 %)	45 (90 %)	-
Ventilation	28 (56 %)	42 (84 %)	0.125

OP* = operating filed

TABLE 3: CROSS INFECTION CONTROL MEASURES: KNOWLEDGE AND PRACTICE BY STUDENTS FROM PAKISTAN AND SWEDEN

Infection Control knowledge and Practice	Frequencies (Percent) in Pakistan N= 50 % (n)	Frequencies (Percent) in Sweden N=50 % (n)	P – value
Sterilization Protocols	45 (90 %)	42 (84 %)	-
Instruments Check	46 (92 %)	42 (84 %)	0.124
Record of sterilization cycle	21 (42 %)	41 (82 %)	0.087
Use of Disposable Instruments	25 (50 %)	38 (76 %)	0.242
Disposal in colored Boxes	17 (34 %)	41 (82 %)	0.005
Instrument Tray sterilization	39 (78 %)	45 (90 %)	-
Spittoon flushed	14 (28%)	34 (68 %)	-
Blood Spillage treatment	20 (40 %)	44 (88 %)	0.258
Re-sheathing devise for sharps disposal	14 (28 %)	39 (78 %)	-
Know Anti-body Levels	25 (50 %)	16 (32 %)	0.148
Experienced Needle Stick Injury	22 (44 %)	17 (34 %)	0.130
Immunization Tests	27 (54 %)	45 (90 %)	-
Disinfectant Use	41 (82 %)	36 (72 %)	0.697
Screening for Hepatitis B & C	33 (66 %)	45 (90 %)	-
Referral of Immunosuppressed patients	26 (52 %)	38 (76 %)	-
Treat transmissible diseases	21 (42 %)	24 (48 %)	-

Pakistan and 50 from Sweden. The most common age group was between 21-25 years in Pakistan and Sweden respectively. The biographic data of the participants are shown in the table 1.

In the second section of the questionnaire, all of the participants defined the term cross infection correctly and all the students in both the countries used gloves before starting any patient. The practice of personal protection was followed by majority of students in both the countries. The use of protective footwear was more significant among students from Sweden as compared to Pakistan. As a measure of extra precaution while treating hepatitis patients, students from both the countries used double gloves and mask. Swedish students possessed significantly greater knowledge regarding the dental surgery design as compared to Pakistani counterparts and are equipped with better knowledge about ventilation for a dental surgery as compared to Pakistani students as shown in Table 2.

Third section included the cross infection measures practiced by the participating students such as sterilizing the dental instruments, treatment of work surfaces and immunization status of the participant and to assess the level of knowledge processed by the students about the same. The sterilization protocols were being observed by students mostly from either of the countries whereas disposal of instruments in colored boxes and re-sheathing devices for sharp disposal was more practiced by Swedish students as compared to the Pakistani students.

DISCUSSION

It is essential that dental institutes around the world should inculcate the knowledge of cross infection control measures in their academic curriculum. Furthermore practice of these measures in the clinics is of utmost importance. While performing a dental procedure on an infected patient, the dentist is likely to get exposed to the pathogenic organisms which are present in the saliva and blood. Blood-borne pathogens cause various notorious diseases in humans [5, 7].

In our study the participants from both the countries did not demonstrate considerable difference in practice of personal protective measures. The personal protection in terms of using facemask and gloves was being practiced in both the countries by almost all of the students. It is owing to the fact that the students in both Sweden & Pakistan are strictly instructed to wear both facemask and gloves before touching a patient. A study in India stated that the face mask and gloves use as protective measure for infection control was practiced by 69.8 % students only [7]. whereas in another study 96.9% participants perceived necessity using face

mask during providing dental care [1]. These personal protection means would be beneficial in preventing the transmission of infection from an infected patient to the operating dentist. The use of eye protection was far less in Pakistani students as compared to Swedish students. The use of goggles was more common than the protective shield in both countries. Most dentists are more comfortable using goggles as compared to the eye shield mainly because goggles are convenient to carry around and are readily available.

A protocol of disposing off medical, hazardous and other non-hazardous waste in separate containers is being practiced worldwide to ensure safe disposal and prevention of cross infection. All the sharp objects like needles and scalpel blades should be stored in an appropriate puncture resistant container and then properly disposed of. Contaminated sharps and microbiological wastes that contain blood or other potentially infected materials (OPIM) should be properly labeled or color-coded, and stored in a closable and leak-proof container. This waste should be discarded as soon as possible. Hazardous waste includes products that are flammable, corrosive, toxic or reactive or prone to risk to health or environment as they can enter the environment through landfill or sewerage system. In the present study, only 34% of Pakistani students disposed of materials in separate containers.

Health care professionals are at a higher risk of acquiring transmittable diseases such as Hepatitis B, C and HIV. The high prevalence of hepatitis B in Pakistan makes it all the more important for the healthcare workers to get vaccinated for hepatitis B. In a recent study conducted in Rawalpindi/Islamabad region, 2.2% health care workers were found to be positive for hepatitis B and C viruses[4]. Studies conducted in the pre-vaccination era showed that HBV was approximately three to six times more than general population [7]. Immunization of the healthcare professionals remains the most effective way of preventing any transmittable disease, as it reduces the incidence of HBV infection in immunized individuals as compared to non-immunized individuals by a 100 fold. Health care workers are generally well aware of the different modes of transmission of these viruses and their potential adverse effects on the body. The purpose of immunization is not only to prevent the health care workers from getting a chronic liver disease but also to avoid him/her becoming a carrier as he/she can transmit it to other patients. Dental students should always be informed about the potential harms of the disease and they should also be trained in the procedures required for effective prevention of infection. The students should also be educated about the necessary action to be taken after they get exposed to a contaminated patients' body fluids[7]. In our study only 54% students from Pakistan got their Hepatitis B vaccination done, which is alarmingly low considering the high prevalence of this disease among Pakistani population and set standards for immunization of health care workers. In one of the study regarding HBV immunization, the vaccination status of dental students was 91.8% [2]. International association recommends that 100% healthcare workers should be immunized by Hepatitis B vaccine.

Needle sticks and sharps are commonly used during dental procedures, thus dental professionals are more prone to sharps related injuries. The reported risks of infections after needle stick injuries infected with pathogens positive patients result in 0.3 % for HIV, 6.0% - 30% for Hepatitis B virus and 10% for Hepatitis C virus [22].It was further concluded that 87% of health care workers encounter at least one needle stick injury and about 82% incidents were not reported or documented. In our study the incidence of needle stick injury is relatively high in students from either of the countries, 44 % from Pakistan and 37.8 % from Sweden. The reason of this high incidence could be lack of skills and experience along with limited assistant availability as well as it may result from accidents induced by other personnel or patients. Students should be taught about reporting the Needle Stick Injury incident and what precautionary measures could avoid or lessen the incidence of such incidents.

High response rate and comparison between knowledge and practice of dental students from two institutes in two different countries were the strong points of the study but there are still factors that impose limitations on the results. The sample size was not large enough to report any major difference, our study was based on the data provided by participants, and the accuracy of the result depends on the accuracy & reliability of the participants. Furthermore, this number of questions cannot show the real knowledge and practice of the respondents. However the numbers of questions were kept to a minimum limit to encourage the participation to respond.

CONCLUSION

The students in Pakistan and Sweden were well equipped about the knowledge of standard cross infection protocols. The practice towards cross infection control in both the countries was encouraging. There is a greater need for hepatitis screening and immunization among Pakistani students. Adequate steps should be taken to minimize the incidence of needle stick injury among the students of both the countries by providing adequate knowledge and handling of instrumentation. Awareness programs are needed for continuously educating the dental team about cross infection control protocols. Further studies should be conducted to evaluate the differences and improvement

in knowledge and practices between different academic years.

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1 Maidah Hanif:	Concept, study design, data collection and drafting the manuscript.
2 Muhamamd Azhar Sheikh:	Approval of topic and final evaluation of data.
3 Mohsin Fazal:	Revising the data critically and evaluation of article's plagiarism.